Food Prices for Nutrition in Tanzania:
Tracking the cost and affordability of healthy diets

Anna Herforth, Rachel Gilbert, and Will Masters, Tufts University
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Today’s program

1. Opening Remarks: Dr. Fulgence Mishili, Sokoine University of Agriculture

2. Prior work and recent progress: Dr. Anna Herforth, co-Principal Investigator, Food Prices for Nutrition Project

3. Closing Remarks: Dr. Joyce Kinabo, Sokoine University of Agriculture

4. Q&A and Discussion
Vision

Food security is when all people, at all times, have physical and economic access to sufficient, safe, nutritious food to meet dietary needs and food preferences for an active and healthy life. – World Food Summit, 1996

Nutrient needs
Dignity
Culture
Protection of health

Accountability requires understanding availability and affordability of healthy diets
Aims: what do we want to know?

• If you went to a market in Tanzania, how much would it cost to obtain nutritious food to meet dietary needs?

• How many people in Tanzania can afford that cost?

Photos: W. A. Masters (Ethiopia, Tanzania, Ghana, Morocco) and S. Kaiyatsa (Malawi)
Indictors of Affordability of Nutritious Diets in Africa (IANDA)

- June 2016: Workshop in Dar es Salaam to convene national and regional food price data stakeholders and end-users
- August 2017: Second workshop in Tanzania to share suite of indicators
- Changing Access to Nutritious Diets in Africa and South Asia (CANDASA) project (2017-2020) scaled up the use of indicators developed in IANDA
Where we left off

1. Sources of price data
2. Metrics
3. Applications
Sources of price data

Explored price data collected by agri-food agencies

• Market information systems (MIS) – in Tanzania, formerly MoA, then MITI
  o Farm-gate, wholesale, or retail prices of basic commodities (rarely processed foods)

• Commodity-specific systems
  o e.g. East Africa Grain Council (EAGC), TAHA

• Early warning systems to guide interventions (e.g. WFP)
  o Prices of staple or basic foods, at markets in vulnerable areas
  o Rapid availability, but few foods

Prices collected by national statistical organizations

• Consumer Price Index (CPI) – In Tanzania, NBS
  o Prices of frequently consumed products, collected monthly in various markets

• World Bank International Comparison Program (ICP) has unique global dataset of retail prices
  o Items limited to comparable products sold in multiple countries; national annual average price per item
Food price data: National Bureau of Statistics CPI data

- Main data are food prices collected by national governments (NBS in Tanzania)
  - Used for measuring inflation with the Consumer Price Index (CPI)
  - NBS collects prices for 98 food items
  - On a monthly basis
  - At representative market locations in all 25 regions

- CPI is generally weighted by share of total expenditure, so culturally acceptable, commonly consumed food items are tracked.

- used to monitor movement of food prices in the country and also give an insight into food security
Cost and Affordability of a Healthy Diet: indicators to understand food access

- Developed in IANDA
- Now used in the UN State of Food Security and Nutrition in the World (2020 and 2021), joining other food security metrics
3 billion people globally lack sufficient income to purchase least-cost healthy diets

% of population who cannot afford a healthy diet
(global total = 3.0 billion, average cost = PPP $3.75)

Source: FAO, 2020; Herforth et al., 2020
Calculating the cost of a healthy diet

- Healthy diet is operationalized as a recommended diet, based on quantitative food-based dietary guidelines (FBDG)

- ~100 countries have FBDG; FAO maintains FBDG repository
  - Only some are quantitative
Benin food-based dietary guidelines are quantitative

<table>
<thead>
<tr>
<th>Group of foods</th>
<th>2-3 yrs</th>
<th>4-8 yrs</th>
<th>9-13 yrs</th>
<th>14-18 yrs</th>
<th>19 yrs +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals and tubers</td>
<td>2 x 3</td>
<td>2 x 4</td>
<td>4 x 5</td>
<td>4 x 6</td>
<td>5 x 7</td>
</tr>
<tr>
<td>Meat, fish, beans, and other protein-rich foods</td>
<td>1 x 2</td>
<td>1 x 2</td>
<td>2 x 3</td>
<td>2 x 3</td>
<td>2 x 3</td>
</tr>
<tr>
<td>Vegetables and legumes</td>
<td>2 x 3</td>
<td>3 x 5</td>
<td>4 x 5</td>
<td>4 x 6</td>
<td>5 x 6</td>
</tr>
<tr>
<td>Fruits</td>
<td>1 x 3</td>
<td>2 x 3</td>
<td>2 x 3</td>
<td>2 x 3</td>
<td>2 x 3</td>
</tr>
<tr>
<td>Dairy products</td>
<td>1 x 2</td>
<td>1 x 2</td>
<td>1 x 2</td>
<td>2 x 2</td>
<td>1 x 2</td>
</tr>
</tbody>
</table>

1. For calcium, consume also some dried fish, dried shrimp, and crabs.
2. Women of childbearing age may need supplements of iron and folate, according to the instructions of health authorities, because their needs are difficult to meet with the diet alone.

- Food groups
- Number of portions per day
- Grams per portion
Steps to calculate the cost of a healthy diet

1. Categorize each food in food price list according to the food groups in the selected dietary guideline
2. Remove items not required for a healthy diet (e.g., sweets) and duplicate items
3. Calculate price per day for each item
   - price per kilogram x recommended quantity per day (accounting for edible portion)
4. Take the average of the 1-3 lowest cost items (price/day) in each food group
5. Sum the cost for all food groups
Healthy diets by any definition are far more expensive than the entire international poverty line.

Source: FAO, 2020
Affordability of diets

Affordability is the comparison of cost to a defined income standard

- Poverty lines
  - National
  - International (US $1.90)
- Food expenditures
- Income
- Wages

Photo (CC): skuarua
Least-cost diets

• Most affordable (cheapest, lowest cost) combination of foods that meet the criteria of these diets

• No standard “food basket”
  o Foods chosen depend on time and place
  o Seasonal or locally-available foods selected
## Most common items in cost of healthy diet by state in India

<table>
<thead>
<tr>
<th>State name</th>
<th>Starchy staples</th>
<th>Proteins</th>
<th>Dairy</th>
<th>Fruit</th>
<th>Vegetables</th>
<th>Leafy vegetables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>Bajra, Ragi, Maize</td>
<td>Peas, Gram, Gram dal</td>
<td>Milk (buffalo), Milk (cow), Curd</td>
<td>Banana, Guava, Papaya (ripe)</td>
<td>Gourd, Onion</td>
<td>Gogukura, Amranth (chaulai), Palak</td>
</tr>
<tr>
<td>Assam</td>
<td>Rice (coarse), Paddy, Bread</td>
<td>Peas, Khesari dal, Gram</td>
<td>Milk (cow), Curd, Milk (buffalo)</td>
<td>Banana, Papaya (ripe), Pineapple</td>
<td>Gourd, Pumpkin, Radish</td>
<td>Bhaji sageaves, Mustard leaves, Gogukura</td>
</tr>
<tr>
<td>Bihar</td>
<td>Maize, Paddy, Wheat (coarse)</td>
<td>Peas, Khesari dal, Pea dal</td>
<td>Milk (cow), Milk (buffalo), Ghol (lassi)</td>
<td>Banana, Guava, Papaya (ripe)</td>
<td>Radish, Gourd, Pumpkin</td>
<td>Bhaji sageaves, Palak, Amranth (chaulai)</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>Bread, Rice (coarse), Wheat (coarse)</td>
<td>Peas, Khesari dal, Gram</td>
<td>Milk (cow), Milk (buffalo), Curd</td>
<td>Banana, Guava, Papaya (ripe)</td>
<td>Radish, Onion, Gourd</td>
<td>Bhaji sageaves, Palak, Amranth (chaulai)</td>
</tr>
<tr>
<td>Delhi</td>
<td>Bajra, Wheat (coarse), Jowar</td>
<td>Gram, Peas, Pea dal</td>
<td>Ghol (lassi), Milk (buffalo), Milk (cow)</td>
<td>Banana, Guava, Pineapple</td>
<td>Radish, Onion, Carrot</td>
<td>Amranth (chaulai), Bhaji sageaves, Mustard leaves</td>
</tr>
<tr>
<td>Gujarat</td>
<td>Bajra, Maize, Jowar</td>
<td>Peas, Gram, Urd (whole)</td>
<td>Milk (buffalo), Milk (cow), Curd</td>
<td>Banana, Papaya (ripe), Guava</td>
<td>Onion, Radish, Tomato</td>
<td>Palak, Bhaji sageaves, Amranth (chaulai)</td>
</tr>
<tr>
<td>Haryana</td>
<td>Bajra, Wheat (coarse), Barley</td>
<td>Gram, Peas, Gram dal</td>
<td>Milk (buffalo), Milk (cow), Curd</td>
<td>Banana, Guava, Papaya (ripe)</td>
<td>Radish, Onion, Carrot</td>
<td>Palak, Mustard leaves, Bhaji sageaves, Palak, Amranth (chaulai)</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>Wheat atta, Maize atta, Rice (coarse)</td>
<td>Gram dal, Besan (ground gram dal), Urd (whole)</td>
<td>Milk (cow), Curd, Ghol (lassi)</td>
<td>Banana, Guava, Mango</td>
<td>Onion, Pumpkin, Carrot</td>
<td>Palak, Bhaji sageaves, Amranth (chaulai)</td>
</tr>
</tbody>
</table>

Source: Raghunathan, Headey, and Herforth, 2020
Least-cost diets

- Most affordable (cheapest, lowest cost) combination of foods that meet the criteria of these diets

- No standard “food basket”
  - Foods chosen depend on time and place
  - Seasonal or locally-available foods selected

- Provide a conservative estimate (lower bound) on the cost per day
  - Preferences or convenience would add to the cost
Food prices create a ladder of affordability

When all diets are affordable, food prices are one of many influences on food choice.

When healthy diets are unaffordable, food prices are an insurmountable barrier to improved diet quality.

Source: Food Prices for Nutrition, October 2020
Food prices create a ladder of affordability

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Other goals (convenience, preferences)

Healthy diets (meet food group recommendations)

Nutrient adequacy (avoid deficiencies or excesses of essential nutrients)

Caloric adequacy (short-term subsistence)

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Healthy diets (meet food group recommendations)

Other goals (convenience, preferences)

Source: Food Prices for Nutrition, August 2021
We have estimated four least-cost diets

• “Energy sufficient diet” - Cost of Calorie Adequacy (CoCA)
  - Minimum cost to meet energy requirements using the least expensive, available starchy staple food in each country

• “Nutrient adequate diet” - Cost of Nutrient Adequacy (CoNA)
  - Minimum cost to meet energy and nutrient requirements (23 macro and micro-nutrients, with upper & lower bounds)

• “Healthy diet” - Cost of Healthy (Recommended) Diet (CoRD)
  - Minimum cost to meet food-based dietary guidelines (FBDG), based on food group classifications; a behaviorally realistic way to meet nutrient needs and other needs, including proportionality, norms, culture, and protection of health against NCDs

• “Healthy diet including food preferences” (CoRD-FP)
  - Minimum cost to meet FBDG, using not only least-cost items, but expenditure shares (of the poor) within food groups
Poverty lines could be based on healthy diet costs

Dietary guidelines could be used to construct poverty lines and safety nets around the cost of a healthy diet

-- For example, Myanmar now uses a basic needs poverty line based on actual expenditure shares

-- Using least-cost items in each food group to form a healthy diet alters weights, and coincidentally in this case does not alter the overall level

-- Using expenditure shares (among the poorest) within food groups would raise diet costs and the level of the poverty line

United States revision to food assistance program benefits (Aug 15, 2021)

• “For at least a decade, critics of the benefits have said they were too low to provide an adequate diet.”
• Updated to meets U.S. food-based dietary guidelines
• “The model ignored preparation time — assuming that SNAP users would buy dried beans and soak them before cooking them, which takes hours but is cheaper than buying them in cans. (Few did.)”
• “In January, President Biden urged the department to speed up the process so that benefits ‘reflect the true cost of a basic healthy diet.’”
• Approx. $6.90 per day (nominal USD, 2021)

Source: The New York Times, 08.15.2021
Nutritious Food Price Index (NPI)

• **Companion to food CPI**
  - CPI weights food items by expenditure share
  - Does not account for nutritional needs
    - If Coca-cola is purchased more, its expenditure share rises
    - If sukuma wiki is purchased less, its expenditure share falls

• **NPI is the unit-free index form of the Cost of a Healthy Diet** (including food preferences)
  - Weights food groups by amounts recommended per day
  - Weights food items by food group weight, and expenditure shares within food group
    - Coca-cola would get a weight of 0; not required for meeting dietary guidelines
    - Sukuma wiki has a relatively high weight because (1) it is in the vegetable group, which has a constant weight reflecting dietary guidelines; (2) it has a relatively high expenditure share within vegetables
Application in Tanzania
Regional variation in the cost of a healthy diet in Tanzania

- High regional variation in the cost of healthy diets
- National Bureau of Statistics monthly retail food price data for 71 items
- National average cost of a healthy diet between 2011-2015 was USD 2.33 (2011 PPP)
  - USD 2.83 in Lindi; USD 2.75 Dar es Salaam
- Diets in the higher cost regions ~35% more expensive than the average cost in the southwest
- Vegetable prices driving high costs – contribute about a third of total diet cost in these areas

Source: Herforth et al., 2020
Food group shares in the cost of a healthy diet by region in the United Republic of Tanzania, 2011–2015

Note: Data shown are the average share of each food group shown in that region’s cost of a healthy diet over all months in each region.

Source: Authors’ own elaboration. Conforms to Map No. 3667 Rev. 6 UNITED NATIONS January 2006.
Seasonal variation of diet costs in Tanzania

- Significant seasonality for 12 of 21 regions in Tanzania
- Fruits and vegetables had stronger seasonality than other food groups
  - Animal-source foods have the lowest seasonality
- Peak cost ~3 months before harvest (May)

Source: Bai, Naumova, and Masters, 2020
How to use the metrics in policy dialogue

• What proportion of people cannot afford a healthy diet?
  o Food security
  o Poverty lines

• Food price index aligned with what people actually need to eat
  o NPI as a companion to food CPI

• Food group-specific unaffordability, inflation, or price spikes
  o Points to needs for investment in agriculture and/or trade
  o Can highlight specific needs for social protection
    o Homestead food production as well as cash transfers
  o May be regionally specific
Rising costs of nutrient-dense foods in Ethiopia

- Price increases from 2002-2016:
  - Pulses increased by about 9x
  - Fruits and vegetables increased by 8x
  - Starchy staples had lowest growth (5-6x)
- Starchy staples have become cheaper while nutrient-rich food groups have become more expensive (Bachewe and Headey, 2019)

Source: Herforth et al., 2020
Outcomes of the 2017 workshop in Dar es Salaam

• Interest in regularly monitoring the Cost of a Healthy Diet (CoRD) and the Nutritious Food Price Index (NPI)
• Interest in comparing the Cost of a Healthy Diet compared to the Cost of Calorie Adequacy (CoCA)
• Decision that NBS data would be the best data source for this monitoring
  o collection of these data belongs to the NBS, and that its scope should respond to the articulated demand for more nutrition sensitivity

• Applications discussed:
  o Ministry of Agriculture has a role in monitoring food security but has been missing nutrition sensitivity in this. These indicators can fill the gap
  o Targeting social protection
  o Informing planners of school feeding programmes to choose low-cost nutritious foods
  o Use in nutrition curricula and realistic behavior change communication
  o Informing producers of potential for business opportunities
Next steps:

Working together to implement monitoring of the Cost of a Healthy Diet
Next steps in Food Prices for Nutrition

Project purpose: Scale up monitoring and analysis of food prices, to guide agricultural production and food markets for improved nutrition

- Support use of new metrics in high-priority countries
- Build a global system to monitor change in food prices for nutrition
- Analyze change in cost and affordability of healthy diets

Actively disseminate tools and results on food prices, diet costs, and affordability

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Tufts University
Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy
International Comparison Program

The World Bank

International Food Policy Research Institute
How does Food Prices for Nutrition differ from other initiatives?

- Emphasis on monitoring
- Focus on leveraging the abundance of data already collected in existing national and international monitoring systems
  - Support countries to calculate metrics within their own data systems
- Other initiatives have focused on cost of nutrient needs (WFP, “Cost of the Diet”)
- Moving beyond nutrients to look at healthy diet patterns
  - Cost of a Healthy Diet does not rely on linear programming → relative ease of computation
  - Food-based dietary guidelines are designed to meet nutrient needs in behaviorally realistic ways
  - Collaboration with WFP to add Cost of a Healthy Diet to their regular work in countries
Tools under construction

- An Excel searchable spreadsheet of food item quantities for calculating the Cost of a Healthy Diet
  - To be included: Tanzania NBS items
  - Shows which food group each food item belongs in
  - Shows how much of each item, as purchased in the market, would satisfy recommendation in food-based dietary guidelines
  - Simplifies task of identifying least-cost items
- User guide for calculating the Cost of a Healthy Diet
Food Prices for Nutrition eLearning course

• Will be hosted on the World Bank’s Open Learning Campus (OLC) platform (Aug 2022)

• 3-hour self-paced course for government officials, program planners, researchers, and others

• Two modules
  o Construction of diet cost indices
  o Use and potential applications of diet cost indices in relation to policymaking
Thank you to our donors

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Words from Prof. Kinabo
Discussion

• Opportunities for using these metrics in Tanzania
  o Which stakeholders?

• Opportunities for incorporating into routine monitoring
  o What is needed? Next steps?
  o Where and how frequently could the indicator be made available?
Stay in touch with us!

- Give us feedback & stay in touch with this Google Form (shared in chat)

- Visit our website: [https://sites.tufts.edu/foodpricesfornutrition/](https://sites.tufts.edu/foodpricesfornutrition/)
  just Google “Food Prices for Nutrition”!

- Reach out with questions or interest – [Rachel.gilbert@tufts.edu](mailto:Rachel.gilbert@tufts.edu)
References


Questions?

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